Crow, and North Crow. The drainage area west of Cheyenne embraces a territory of approximately 350 square miles, the elevation of which varies from 6000 to 9000 feet above sea level.

The rainfall over southeastern Wyoming during the first two decades of May was unusually heavy, but the snowfall during the previous winter had been unusually light. No precipitation records had been kept in the Crow Creek Valley, except at Cheyenne. During the night of the 19th, a rainfall of 0.63 of an inch was recorded at Cheyenne, followed on the 20th by 1.10 inches, nearly one inch of which fell between 4 and 5 p. m. It is to be regretted that more extensive rainfall records for Crow Creek Valley are not available, as it is probable that the precipitation was much heavier along the valley of Middle and South Crow than at Cheyenne; at least reports and circumstances seem to so indicate.

The streets of Cheyenne were flooded during the afternoon and evening, although little or no damage was done on the higher grounds. The damage was done on the lowlands along the course of the creek, which skirts the western edge of the city, flows beneath the tracks of the main line of the Union Pacific Railroad, and then through the south side of Cheyenne.

The large volume of water poured into the creek during the afternoon raised the stream to an unprecedented height, reliable reports indicating that the wall of water which swept down the creek during the evening was from 20 to 25 feet high in places. Owing to lack of telephonic communication, no warning could be given the people of the approaching flood, and the residents on the "flats" along the creek in the western part of Cheyenne were caught in their homes, with no chance for escape except through the raging waters. The crest of the flood reached Cheyenne about 9 p. m., local time, and within two hours had begun to subside. By the following morning the creek was again confined within its banks.

The greatest danger from the flood was in west Cheyenne, on the "flats," where the water was somewhat checked in its flow by the embankment of the Union Pacific Railroad tracks, and where all of the lowlands were flooded to a depth of from 4 to 10 feet. The fire bells brought the people to the scene, and willing hands did all that could be done to rescue the people from their homes, which in some cases were being carried away by the flood. Row boats were rapidly brought from a lake about a mile away. Mounted men readily rode into the flood, at the risk of their lives, and brought people to places of safety. The darkness of the night made the work of rescue exceedingly dangerous, but the rescuers were spurred to their greatest efforts by the cries of the imprisoned people. Although many were in imminent danger of drowning, the loss of life was limited to two children.

The damage from the flood was not as great on the south side, where the creek had a chance to overflow a much wider section, with a consequent diminution in the rapidity of the flow. While some fences, walks, and outbuildings were slightly damaged, no dwellings were washed away.

The loss from the flood throughout the entire Crow Creek Valley is difficult to estimate, but it was probably more than $100,000. Several miles of the Colorado & Southern Railroad tracks were washed away above Cheyenne, and the bridge on the Denver division of the Union Pacific Railroad was so much damaged that traffic was suspended for two or three days. There was not a bridge left in serviceable condition across the creek, except the bridge on the main line of the Union Pacific Railroad. Two substantial steel bridges in the city were ruined, besides several bridges of cheaper construction. Some damage was done at Fort D. A. Russell, 4 miles west of Cheyenne. On the "flats" in west Cheyenne about a dozen houses were washed from their foundations.

A reliable estimate of the flow of the creek during the passage of the flood wave places it at 7000 cubic feet per second, or a total of over 70,000,000 cubic feet during the three hours of highest water. The normal flow of Crow Creek is but 10 cubic feet per second. The highest water ever gaged in the Laramie River, which drains an area ten times as great as the area drained by Crow Creek above Cheyenne, was but 6500 cubic feet per second, 500 cubic feet less than the estimated flow of Crow Creek during the flood of May 20, 1904.

RECENT PAPERS BEARING ON METEOROLOGY.

Mr. H. H. KIMBALL, Librarian, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——.

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—— The Stability of Solar Spectrum Wave-Lengths. P. 87.

Symons's Meteorological Magazine. London. Vol. 39.

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Exner, Felix M. Messungen der Intensität der Sonnenstrahlung auf Spitzbergen. Pp. 224-225.

—— F. A. Förel über die Kontinuität des Bishopschen Ringes. Pp. 225-226.

Reimann, —. Ring um die Sonne. P. 226.

—— Lad. Gorczynski über die Abnahme der Intensität der Sonnenstrahlung im Jahre 1902 und 1903. P. 226.

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—— Luftelektrische Messungen im Hochtal von Arosa. Pp. 227-228.

—— J. Hann über die Luftströmungen auf dem Gipfel des Säntis (2504m) und ihre jährliche Periode. Pp. 228-230.

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Ed. Mazelle. Ueber den Einfluss der Bora auf die tägliche Periode einiger meteorologischer Elemente. P. 231-232.

Friesenhof, —. Die Temperatur-Depressionen im Monate Mai, zugleich ein Beitrag zur Frage der Eismännerperiode und des Urban. Pp. 232-235.

—— Barometerbeobachtungen in Langenburg am Nyassa. Pp. 235-236.

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—— Klima von Köln a Rh. Pp. 238-239.

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Mk. Der Januar 1904 in Tokio. 244-245.

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NOTES AND EXTRACTS.

TORNADO IN INDIAN TERRITORY.

Mr. C. M. Strong, Section Director, Oklahoma, Okla., sends data relative to a tornado on April 24. The tornado was first heard of at Choteau, Ind. T. It began in the Verdigris River bottoms, and extended northeast to the northern part of the Cherokee Nation country. Destruction is reported from Choteau, Fairland, and Clearwater. Large hailstones and a deluge of rain accompanied the tornado in the Cherokee Nation. A general electric storm prevailed all day, followed by a heavy downfall of rain and then by the tornado.

The postmaster at Ketchum reports that the storm passed through that place about 12 o'clock (probably central time), leaving the river bottom and striking the hills and then the prairie beyond. The storm was visible for five or ten minutes as it passed in a northeast direction, a little east of Ketchum.

It moved up the Grand River Valley, reaching Cleora, Ind. T., 7 miles south of Afton, on Sunday, April 24, at 12:25 p. m.

The postmaster at Afton thinks possibly there were two storms traveling parallel with each other 6 or 7 miles apart, each of them destroying everything it came in contact with when it descended to the ground, and each path of destruction ranging from 150 to 300 feet wide. As a rule houses that were destroyed were carried and scattered to the northeast. The storm was pretty generally over in twenty minutes, covering a territory measuring 6 or 7 miles east and west and 30 miles north and south.

The postmaster at Fairland says: "Storm came at 12:35 p. m., after a heavy rain of about thirty minutes with some hail. It was noticed some half hour before, but thought it was going west of us. It came from the south and lasted about one minute. The path of the destructive wind was about 400 yards wide; débris was thrown in all directions. Some observed the funnel-shaped cloud, but I did not. The cloud lifted after leaving here and no damage was reported north of us."

It was last observed at Fairland. The funnel cloud was noted, but the first intimation of the approach of the tornado was a loud, roaring noise. The general direction of the path was north and east, and the width of the path of destruction about one-fourth of a mile.

From Choteau to Fairland the track covers about 60 miles in length. The storm is said to have been the worst that has been known in the Indian Territory.

TORNADO AT GRAND RAPIDS, MICH.

The following details of a tornado at Grand Rapids, Mich., on March 24, are obtained from the report of Mr. C. F. Schneider, Section Director at that place. The tornado moved in a due northeasterly direction across the southeastern portion of the city, over a path about 2 miles long and from 25 to 200 feet in width. Nothing could be learned regarding the appearance of the sky or the atmosphere during the passage of the tornado, because it had been a wet, stormy evening, and almost everyone was indoors.

At the Weather Bureau office, distant about 2½ miles from the nearest point of the storm's path, the records show a steadily increasing southeasterly wind from about 8 p. m. (seventy-fifth meridian time), until 10 p. m., when it had reached a velocity of 32 miles. At 10:05 p. m., when the wind had suddenly shifted to the southwest, it attained a maximum velocity of 52 miles. It then decreased with equal sudden-